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| 10/816,623 | 04/02/2004 | Scott B. Peterson | 590282001700 | 1063 |

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| EXAMINER | |
|---|---|
| BROOME, SAID A | |

| ART UNIT | PAPER NUMBER |
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| 2628 | |

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| **Office Action Summary** | **Application No.** 10/816,623 | **Applicant(s)** PETERSON, SCOTT B. | |
|---|---|---|---|
| | **Examiner** Said Broome | **Art Unit** 2628 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 20 September 2006.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-101 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 21-30,32-39 and 57-72 is/are allowed.

6)☒ Claim(s) 1,2,40,73-79,84,88-91 and 93-101 is/are rejected.

7)☒ Claim(s) 3-20,31,41-56,80-83,85-87 and 92 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. This office action is in response to an amendment filed 9/20/2006.

2. Claims 1-92 are original.

3. Claims 93-101 have been added by the applicant.

### *Allowable Subject Matter*

Claims 21-30, 32-39 and 57-78 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art, Touma et al., Lee et al. and Mack do not teach all the limitations of claim 21. Touma et al. teaches determining offset vertices of a 3D model and determining the difference between the predicted offset vertex and the actual offset vertex in column 3 lines 61-63 ("...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh...extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory. However, none of the cited prior art

teaches traversing a plurality of reference vertices on a surface of the reference model associated with the offset model, and for each reference vertex: selecting an offset vertex of the offset model corresponding to the reference vertex, selecting a basis coordinate system on the reference model with respect to the reference vertex, the basis coordinate system defined by vertices nearby the reference vertex, the basis coordinate system providing the basis coordinates for the reference vertex, selecting a basis coordinate system on the offset model, determining a position of the reference vertex in the basis coordinate system on the reference model; and predicting the offset vertex by applying the position of the reference vertex in the basis coordinate system on the reference model to the basis coordinate system on the offset model, as recited in claim 21.

The prior art, Touma et al., Lee et al. and Mack do not teach all the limitations of claim 57. Touma et al. teaches determining offset vertices of a 3D model and determining the difference between the predicted offset vertex and the actual offset vertex in column 3 lines 61-63 ("...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh...extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory. Mack teaches combining the predicted

offset vertices and the stored differences to produce the offset vertices of the offset model in column 4 lines 13-16 ("Assuming that vertex 2 is (5.5, 20, 26), compression machine 100 then subtracts vertex 2 from vertex 1 using combination unit 118 to generate (0.5, 1, 0.5) which is stored.") and column 4 lines 41-46 ("Predictor 502 receives coordinates (0.5, 0, 1), and adds the coordinates to vertex 1 to generate vertex 2 (5.5, 20, 26)."). However, none of the cited prior art teaches traversing a plurality of reference vertices on a surface of the reference model associated with the offset model, and for each reference vertex: selecting an offset vertex of the offset model corresponding to the reference vertex, selecting a basis coordinate system on the reference model with respect to the reference vertex, the basis coordinate system defined by vertices nearby the reference vertex, the basis coordinate system providing the basis coordinates for the reference vertex, selecting a basis coordinate system on the offset model; determining a position of the reference vertex in the basis coordinate system on the reference model; and predicting the offset vertex by applying the position of the reference vertex in the basis coordinate system on the reference model to the basis coordinate system on the offset model, as recited in claim 57.

The prior art, Touma et al., Lee et al. and Mack do not teach all the limitations of claim 73. Touma et al. teaches a computer program product, comprising a computer readable medium storing a compressed, offset animation model in column 12 lines 49-67 and column 13 lines 1-5 ("FIG. 1 is a schematic illustration of a system 18 for transmission of a three-dimensional mesh object 22...Object 22 is then compressed using a software program...The compressed form of object 22...is transmitted from server 24 over a network to one or more receiving computers 26 where it may be decompressed, using compatible software, displayed and/or stored."). However, none of the cited prior art teaches a plurality of seed vertices, each seed vertex corresponding to a

row of reference vertices on a surface of a reference model associated with the offset model, the seed vertices for predicting a plurality of offset vertices on a surface of the offset model; and a plurality of differences between predicted offset vertices and actual offset vertices, for combining with the plurality of offset vertices predicted form the seed vertices to produce a plurality of final offset vertices on the surface of the offset model.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-78, 88-95 and 98-100 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding claims 1-72, 88-95 and 98-100, the claims are rejected under 35 U.S.C. 101 because they recite an abstract idea, which is not statutory because it is a judicial exception. Practical application of judicial exception would make it statutory wherein the practical application requires tangible result of the claimed invention.

Regarding claims 73-78, the claims recite a computer program product comprising a computer readable medium, however the claims recite nonfunctional descriptive material on the computer readable medium, therefore the claims are not statutory. When nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, it is not statutory since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive

material, i.e., abstract ideas, stored in a computer-readable medium, in a computer, on an electromagnetic carrier signal does not make it statutory.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2 and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Touma et al. (US Patent 6,167,159) in view of Lee et al. ("Vertex Data Compression For Triangular Meshes").

Regarding claim 1, Touma et al. teaches al the limitations except using a basis coordinate system respectively associated with the reference vertices. Touma et al. teaches a method for compressing an animation model in column 1 lines 65-67 ("...compact storage of 3D objects."), the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."), column 6 lines 40-50 ("...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value...") and in column 11 lines 16-17 ("...outputting the list includes rendering the mesh."), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. also teaches predicting offset vertices of the offset

model or mesh for corresponding reference vertices of a reference model associated with the offset model in column 6 lines 40-50 ("...compressing a mesh including a plurality of vertices having geometric coordinates, including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a plurality of the preceding vertices in the consecutive order..."). Touma et al. also teaches determining a difference between the predicted offset vertices and actual offset vertices of the offset model in column 3 lines 61-63 ("...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory. Touma et al. also teaches reconstruction or rendering of the actual offset vertices using the reference vertices and the differences in column 10 lines 1-8 ("...a stream of signals into a mesh including a plurality of vertices...representing the degrees of the vertices in a consecutive order, from the stream, and which generates and renders the mesh..."), where it is described that the rendering is performed

based on streams of information regarding the difference between the offset and actual vertices as described in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate..."). Again, Touma et al. fails to teach using a basis coordinate system respectively associated with the reference vertices. Lee et al. teaches using a basis coordinate system respective to the reference, or previous processed, vertices on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices."), which basis coordinate system formed for all the vertices as described on page lines ("we transform all the vertices...by the previously processed triangle..."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Touma et al. with Lee et al. because this combination would provide efficient reduction of data used to represent three-dimensional objects through storage of compression of the data.

Regarding claim 2, Touma et al. fails to teach the limitations. Lee et al. teaches a basis coordinate system that comprises a set of vertices that are vertices previously traversed on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices. "). The motivation to combine the teachings of Touma et al. and Lee et al. is equivalent to the motivation of claim 1.

Regarding claim 79, Touma et al. teaches all the limitations except using a basis coordinate system respectively associated with the reference vertices. Touma et al. teaches a system for compressing an animation model in column 12 lines 49-63 ("FIG. 1 is a schematic illustration of a system 18 for transmission of a three-dimensional mesh object 22...Object 22 is

then compressed using a software program...“), the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 (“the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates.“), column 6 lines 40-50 (“...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value...“) and in column 11 lines 16-17 (“...outputting the list includes rendering the mesh.“), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. also teaches predicting offset vertices of the offset model or mesh for corresponding reference vertices of a reference model associated with the offset model in column 6 lines 40-50 (“...compressing a mesh including a plurality of vertices having geometric coordinates, including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a plurality of the preceding vertices in the consecutive order...“). Touma et al. also teaches determining a difference between the predicted offset vertices and actual offset vertices of the offset model in column 3 lines 61-63 (“...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates.“). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 (“...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted

coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory. Touma et al. also teaches reconstruction or rendering of the actual offset vertices using the reference vertices and the differences in column 10 lines 1-8 ("...a stream of signals into a mesh including a plurality of vertices...representing the degrees of the vertices in a consecutive order, from the stream, and which generates and renders the mesh..."), where it is described that the rendering is performed based on streams of information regarding the difference between the offset and actual vertices as described in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate..."). Again, Touma et al. fails to teach using a basis coordinate system respectively associated with the reference vertices. Lee et al. teaches using a basis coordinate system respective to the reference, or previous processed, vertices on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices."), which basis coordinate system formed for all the vertices as described on page lines ("we transform all the vertices...by the previously processed triangle..."). The motivation to combine the teachings of Touma et al. and Lee et al. is equivalent to the motivation of claim 1.

Claims 40, 84, 88, 90 and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Touma et al. in view of Lee et al. in further view of Mack (US 6,831,637).

Regarding claim 40, Touma et al. teaches all the limitations except using a basis coordinate system and combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Touma et al. teaches a method for decompressing a compressed animation model, in column 7 lines 18-26 ("...a method for decompressing a compressed stream of signals into a mesh having a plurality of vertices having geometric coordinates...“), the model representing an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates.“), column 6 lines 40-50 ("...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value...“) and in column 11 lines 16-17 ("...outputting the list includes rendering the mesh.“), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. also teaches determining a difference between the predicted offset vertices and actual offset vertices of the offset model in column 3 lines 61-63 ("...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates.“). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh...including extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate

thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), therefore one of ordinary skill in the art would be capable of retrieving the stored difference data because the signals containing the differences between the predicted values and actual values are stored in memory. Again, Touma et al. fails to teach using a basis coordinate system respectively associated with the reference vertices and combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Lee et al. teaches using a basis coordinate system respective to the reference, or previous processed, vertices on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices."), which basis coordinate system formed for all the vertices as described on page lines ("we transform all the vertices...by the previously processed triangle..."). Touma et al. and Lee et al. fail to teach combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Mack teaches combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model in column 4 lines 13-16 ("Assuming that vertex 2 is (5.5, 20, 26), compression machine 100 then subtracts vertex 2 from vertex 1 using combination unit 118 to generate (0.5, 1, 0.5) which is stored.") and column 4 lines 41-46 ("Predictor 502 receives coordinates (0.5, 0, 1), and adds the coordinates to vertex 1 to generate vertex 2 (5.5, 20, 26)."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Touma et al., Lee et al. and Mack because this combination would provide efficient reduction of data used to represent three-dimensional objects through storage of compressed differences between predicted and actual vertices.

Regarding claim 84, Touma et al. teaches all the limitations except using a basis coordinate system respectively associated with the reference vertices. Touma et al. teaches a system for decompressing an animation model in column 10 lines 38-41("...apparatus for decompressing a compressed stream of signals into a mesh having a plurality of vertices having geometric coordinates..."), the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."), column 6 lines 40-50 ("...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value...") and in column 11 lines 16-17 ("...outputting the list includes rendering the mesh."), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. . Touma et al. also teaches predicting offset vertices of the offset model or mesh for corresponding reference vertices of a reference model associated with the offset model in column 6 lines 40-50 ("...compressing a mesh including a plurality of vertices having geometric coordinates, including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a plurality of the preceding vertices in the consecutive order..."). Touma et al. also teaches determining a difference between the predicted offset vertices and actual offset vertices of the offset model in column 3 lines 61-63 ("...vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."). Touma et al. also teaches

storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory. Touma et al. also teaches reconstruction or rendering of the actual offset vertices using the reference vertices and the differences in column 10 lines 1-8 ("...a stream of signals into a mesh including a plurality of vertices...representing the degrees of the vertices in a consecutive order, from the stream, and which generates and renders the mesh..."), where it is described that the rendering is performed based on streams of information regarding the difference between the offset and actual vertices as described in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate..."). Again, Touma et al. fails to teach using a basis coordinate system respectively associated with the reference vertices. Lee et al. teaches using a basis coordinate system respective to the reference, or previous processed, vertices on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices."), which basis coordinate system formed for all the vertices as described on page lines ("we transform all the vertices...by the previously processed

triangle…"). The motivation to combine the teachings of Touma et al., Lee et al. and Mack is equivalent to the motivation of claim 40.

Regarding claim 88, Touma et al. teaches al the limitations except using a basis coordinate system respectively associated with the reference vertices and combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Touma et al. teaches a method for compressing, in column 1 lines 65-67 ("…compact storage of 3D objects."), and decompressing, in column 10 lines 38-41("…apparatus for decompressing a compressed stream of signals into a mesh having a plurality of vertices having geometric coordinates…"), an animation model, the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."), column 6 lines 40-50 ("…to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value…") and in column 11 lines 16-17 ("…outputting the list includes rendering the mesh."), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. also teaches predicting offset vertices of the offset model or mesh for corresponding reference vertices of a reference model associated with the offset model in column 6 lines 40-50 ("…compressing a mesh including a plurality of vertices having geometric coordinates, including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a

plurality of the preceding vertices in the consecutive order…"). Touma et al. also teaches determining a difference between the predicted offset vertices and actual offset vertices of the offset model in column 3 lines 61-63 ("…vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."). Touma et al. also teaches storing the differences between the predicted offset vertices and actual offset vertices in column 8 lines 1-13 ("…a method for decompressing a compressed stream of signals into a mesh… including extracting a coordinate list from the stream…extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate…") and column 7 lines 13-14 ("…storing the stream of signals in a memory."), therefore one of ordinary skill in the art would be capable of retrieving the stored difference data because the signals containing the differences between the predicted values and actual values are stored in memory. Touma et al. also teaches reconstruction or rendering of the actual offset vertices using the reference vertices and the differences in column 10 lines 1-8 ("…a stream of signals into a mesh including a plurality of vertices…representing the degrees of the vertices in a consecutive order, from the stream, and which generates and renders the mesh…"), where it is described that the rendering is performed based on streams of information regarding the difference between the offset and actual vertices as described in column 8 lines 1-13 ("…a method for decompressing a compressed stream of signals into a mesh… including extracting a coordinate list from the stream…calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate…"). Again, Touma et al. fails to teach using a basis coordinate

system respectively associated with the reference vertices and combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Lee et al. teaches using a basis coordinate system respective to the reference, or previous processed, vertices on page 1 first column paragraph one lines 6-7 ("...a coordinate system formed by the three previously processed vertices."), which basis coordinate system formed for all the vertices as described on page lines ("we transform all the vertices...by the previously processed triangle..."). Touma et al. and Lee et al. fail to teach combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model. Mack teaches combining the predicted offset vertices and the stored differences to produce the offset vertices of the offset model in column 4 lines 13-16 ("Assuming that vertex 2 is (5.5, 20, 26), compression machine 100 then subtracts vertex 2 from vertex 1 using combination unit 118 to generate (0.5, 1, 0.5) which is stored.") and column 4 lines 41-46 ("Predictor 502 receives coordinates (0.5, 0, 1), and adds the coordinates to vertex 1 to generate vertex 2 (5.5, 20, 26)."). The motivation to combine the teachings of Touma et al., Lee et al. and Mack is equivalent to the motivation of claim 40.

Regarding claim 90, Touma et al. teaches a method for decompressing an animation model in column 10 lines 38-41("...apparatus for decompressing a compressed stream of signals into a mesh having a plurality of vertices having geometric coordinates..."), the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."), column 6 lines 40-50 ("...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are

represented as an offset from a predicted value…") and in column 11 lines 16-17 ("…outputting the list includes rendering the mesh."), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. also teaches storing a compressed representation of the a surface of an offset model in column 8 lines 1-13 ("…a method for decompressing a compressed stream of signals into a mesh…including extracting a coordinate list from the stream…extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate…") and column 7 lines 13-14 ("…storing the stream of signals in a memory."), therefore one of ordinary skill in the art would be capable of retrieving the stored difference data because the signals containing the differences between the predicted values and actual values are stored in memory. Touma et al. fails to teach decompressing the compressed geometric representation with respect to the reference model at the second time, or actual vertice, to produce the offset model at the first time, or predicted vertice. Mack teaches decompressing the compressed geometric representation with respect to the reference model at the second time, or actual vertice, to produce the offset model at the first time, or predicted vertice in column 4 lines 39-42 ("Decompression 504 retrieves the coordinates from the compressed list and stores it in data unit 508. Predictor 502 receives coordinates (0.5, 0, 1), and adds the coordinates to vertex 1 to generate vertex 2 (5.5, 20, 26)."). The motivation to combine the teachings of Touma et al., Lee et al. and Mack is equivalent to the motivation of claim 40.

Regarding claim 91, Touma et al. teaches a system for providing a compressed animation model for an animation cycle in column 6 lines 40-50 ("...including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value...") where it is described that the vertices of a 3D object are compressed in a consecutive order, therefore the object would be capable of compression in an animation cycle for a plurality of frames of animation. Touma et al. teaches a reference model comprising a geometric representation describing that surface of the model for a first frame of animation cycle in column 6 lines 40-50 ("...including arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a plurality of the preceding vertices in the consecutive order...") where it is described that the predicted and actual vertices are represented in consecutive order, and it is also described in column 12 lines 57-60 ("Object 22 is preferably generated in accordance with the VRML standard or is translated into the VRML standard, using computer programs known in the art..."), that the objects are compatible with VRML files that are known in the art to comprise animation 3D models. Touma et al. also teaches a plurality of compressed, offset animation models, each compressed offset animation model corresponding to a subsequent or consecutive frame of the animation cycle, and comprising a compressed geometric representation of a surface of the offset model corresponding to the reference vertices in column 1 lines 65-67 ("...compact storage of 3D objects.") and in column 6 lines 40-50 ("...arranging the vertices in a consecutive order, compressing the coordinates so as to generate a compressed coordinate list in which the

coordinates of at least one of the vertices are represented as an offset from a predicted value, which is calculated based on the coordinates of a plurality of the preceding vertices in the consecutive order...").

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 89 is rejected under 35 U.S.C. 102(b) as being anticipated by Touma et al.(US Patent 6,167,159).

Regarding claim 89, Touma et al. teaches a method for compressing an animation model in column 1 lines 61-64 ("...present invention to provide apparatus and methods of compression to allow fast transfer of three dimensional (3D) objects..."), the model comprising an offset model including a plurality of surfaces, each surface including a plurality of vertices in column 3 lines 58-63 ("the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates."), column 6 lines 40-50 ("...to generate a compressed coordinate list in which the coordinates of at least some of the vertices are represented as an offset from a predicted value...") and in column 11 lines 16-17 ("...outputting the list includes rendering the mesh."), where it is described that the offset or difference between the vertices of contained on the mesh surface the model is rendered when the list of offset values is generated. Touma et al. teaches compressing the animation model by compressing a geometric

representation of the surface of the offset model at a first time, or predicted vertice, with respect to a reference model at a second time earlier than the first time, or actual vertice, in column 3 lines 58-65 ("...the vertex coordinates are represented by an offset between a prediction of the coordinates and the actual coordinates. Preferably, the prediction is based on more than one other vertex appearing earlier in the consecutive order..."). Touma et al. also teaches storing the compressed representation in column 8 lines 1-13 ("...a method for decompressing a compressed stream of signals into a mesh... including extracting a coordinate list from the stream...extracting from the coordinate list at least one value representing an offset from an actual coordinate of one of the vertices to a predicted coordinate thereof, calculating the predicted value of the vertex coordinate, and subtracting the offset from the predicted value to obtain the actual coordinate...") and column 7 lines 13-14 ("...storing the stream of signals in a memory."), where it is described that the signals containing the differences between the predicted values and actual values are stored in memory.

Claims 93-101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Touma et al. in view of Lee et al. in further view of Jung et al.(herein "Jung" US Patent 5,978,030).

Regarding claims 93-101, Touma et al. and Lee et al. fail to teach the limitations. Jung teaches that a reference model is associated with an animation model at a particular reference time in a sequence of animation frames in column 4 lines 59-64, where specific feature points of a model from a frame of animation is chosen as described in column 10 lines 65-67 – column 11 line 1 ("...the set of feature points are selected from a multiplicity of pixels contained in the reconstructed reference frame, each of the feature points is defined in terms of the position of a

pixel.") and as shown in Figure 6E. It would have been obvious to one of ordinary skill in the art to combine the teachings of Touma, Lee and Jung because this combination would provide a reduction in the amount of data required for animation by compressing difference data associated with vertices of a model in a current frame and a predicted offset of the vertices in a subsequent frame.

### *Claim Objections*

Claims 3-20, 31, 41-56, 80-83, 85-87 and 92 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### *Response to Arguments*

Applicant's arguments filed 9/20/2006 have been fully considered but they are not persuasive.

The applicant argues that the references Touma et al. (US Patent 6,167,159) in view of Lee et al. ("Vertex Data Compression For Triangular Meshes") in the 35 U.S.C. 103(a) rejection of claim 1 do not teach a reference model. The examiner maintains the rejection because Touma et al. teaches vertices of a mesh model that are used to predict offset vertices in column 3 lines 55-57 and in column 6 lines 51-52, therefore initial vertices of the mesh model represents the reference model and the predicted vertices of the mesh represents the vertices of a predicted offset model .

The applicant argues that the references Touma et al. (US Patent 6,167,159) in view of Lee et al. ("Vertex Data Compression For Triangular Meshes") in the 35 U.S.C. 103(a) rejection of claim 1 do not teach a reference model associated with a frame and an offset model associated with subsequent frames. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., ...reference model for a particular frame and a predicted offset model in a subsequent frame...) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Broome SB
12/6/06

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER